

REMARKS

In view of the above amendments and the following remarks, reconsideration of the rejections contained in the Office Action of October 13, 2006 is respectfully requested.

By this Amendment, claims 1-8 have been cancelled and new claims 9-16 have been added and are currently pending in the application. No new matter has been added by these amendments.

In order to make editorial improvements, the entire specification and abstract have been reviewed and revised. Due to the revisions, the amendments to the specification and abstract have been incorporated into the attached substitute specification and abstract. For the Examiner's benefit, a marked-up copy of the specification and abstract indicating the changes made thereto is also enclosed. No new matter has been added by the revisions. Entry of the substitute specification is thus respectfully requested.

On pages 2-3 of the Office Action, the Examiner rejected claims 1 and 3-5 under 35 U.S.C. § 103(a) as being unpatentable over Wobben (WO 02/057624) in view of Flamang (WO 03/031811). In addition, on pages 3-4 of the Office Action, the Examiner rejected claims 2 and 6-8 under 35 U.S.C. § 103(a) as being unpatentable over Wobben in view of Flamang, and further in view of Ai (US 5,975,762). However, as indicated above, original claims 1-8 have been cancelled and replaced with new claims 9-16. For the reasons discussed below, it is respectfully submitted that the new claims are clearly patentable over the prior art of record.

The discussion of the invention provided below makes reference to the figures of the present application. However, these references are made only for the Examiner's benefit, and are not intended to limit the claims.

The present invention is directed to a wind turbine which, as shown in Figs. 1 and 2, includes a nacelle 3 on a tower 2, and a main shaft 11 connected to wind turbine rotating blades 5 by a rotor head 4 at a front side of a wall portion W1 of the nacelle 3. The wind turbine also includes a gear-box 12 and a generator 13 housed within the nacelle 3. The main shaft 11 is connected to an input shaft 12a of the gear-box 12, and the main shaft 11 is supported by the wall portion W1 of the nacelle 3 via a single double-row tapered roller bearing 16 provided coaxially with the main shaft 11. Alternatively, as shown in Fig. 12, the main shaft 11 can be supported by a single three-row roller bearing 92. The single double-row tapered roller bearing 16 or three-

row roller bearing 92 is positioned at the front side of the wall portion W1 and at an axial end portion of the main shaft 11.

New independent claim 9 recites a power generating wind turbine comprising a nacelle supported by a tower, a main shaft connected to a wind turbine rotating blade at a front side of a wall portion of the nacelle, and a generator housed within the nacelle. The wind turbine of claim 9 also includes a gear-box for increasing a rotational speed of an output shaft of the gearbox to drive the generator, with the gear-box being housed within the nacelle. Claim 9 further recites that the main shaft is connected to an input shaft of the gear-box, and that the main shaft is supported by the wall portion of the nacelle via a single double-row tapered roller bearing provided coaxially with the main shaft, with the single double-row tapered roller bearing being positioned at the front side of the wall portion and at an axial end portion of the main shaft.

New independent claim 13 recites a power generating wind turbine comprising a nacelle supported by a tower, a main shaft connected to a wind turbine rotating blade at a front side of a wall portion of the nacelle, and a generator housed within the nacelle. The wind turbine of claim 13 also includes a gear-box for increasing a rotational speed of an output shaft of the gearbox to drive the generator, with the gear-box being housed within the nacelle. Claim 13 further recites that the main shaft is connected to an input shaft of the gear-box, and that the main shaft is supported by the wall portion of the nacelle via a single three-row roller bearing provided coaxially with the main shaft. Claim 13 also recites that the single three-row roller bearing has a first row of rollers for receiving a radial load and second and third rows of rollers for receiving a thrust load, and that the single three-row roller bearing is positioned at the front side of the wall portion and at an axial end portion of the main shaft.

Wobben discloses a wind energy unit which, as shown in Fig. 1, includes a hollow shaft 11 attached to blades 13. The hollow shaft 11 is attached to an axle sleeve 20 by a double-row taper roller bearing 15. However, Wobben does not disclose the main shaft being supported by a wall portion of the nacelle via a single double-row tapered roller bearing or a single three-row roller bearing that is positioned at a front side of the wall portion, as required by new independent claims 9 and 13. Rather, Wobben discloses that the double-row taper roller bearing 15 is positioned within the components of a concentric generator 7.

In particular, Wobben discloses a generator 7 which includes a stator 8 and a rotor 9. The

stator 8 is attached to a star-shaped carrier 6 which is fixed to a center ring 5. The rotor 9 is attached to a star-shaped carrier 10 which is connected to the rotatable outer ring of the double-row tapered roller bearing 15, which is connected to the hollow shaft 11. Therefore, Wobben does not disclose the main shaft being supported by a wall portion of the nacelle via a single double-row tapered roller bearing or single three-row roller bearing that is positioned at a front side of the wall portion, because Wobben discloses that the hollow shaft 11 is supported by the components of the generator 7 (e.g., the flange 14 of the star-shaped carrier 6), with the double-row tapered roller bearing 15 being positioned within the components of the generator 7.

In addition, as indicated by the Examiner on page 2 of the Office Action, Wobben does not disclose a gear-box housed within the nacelle and connected to the main shaft, as required by independent claims 9 and 13.

Flamang discloses a wind turbine which, as shown in Figs. 1 and 2, includes a gear unit 130 and a generator 140 housed within a nacelle 160. A rotor shaft 110 is connected to the rotor blades 100 and is supported within the nacelle by bearings 120. However, Flamang does not disclose the main shaft being supported by the wall portion of the nacelle via a single double-row tapered roller bearing or single three-row roller bearing that is positioned at a front side of the wall portion, as required by new independent claims 9 and 13. Rather, Flamang only discloses that the rotor shaft is supported by bearings 120 within the nacelle. In other words, Flamang does not disclose the main shaft being supported by a wall portion of the nacelle because Flamang only discloses the rotor shaft 110 being supported to bearings 120 on a raised platform. Further, Flamang does not disclose the main shaft being supported by a wall portion via a single double-row tapered roller bearing or single three-row roller bearing positioned at the front side of the wall portion because Flamang discloses that the bearings are positioned within the nacelle (i.e., at a rear side of the wall portion).

Ai discloses a three row roller bearing as shown in Figs. 11 and 12. However, Ai does not disclose a wind turbine, or a main shaft supported by a wall portion of a nacelle by a single double-row tapered roller bearing or single three-row roller bearing positioned at a front side of the wall portion, as required by new independent claims 9 and 13.

Therefore, for the reasons presented above, it is believed apparent that the present invention as recited in new independent claims 9 and 13 is not disclosed or suggested by the

Wobben reference, the Flamang reference and the Ai reference taken either individually or in combination. Accordingly, a person having ordinary skill in the art would clearly not have been motivated to modify the Wobben reference in view of the Flamang reference and the Ai reference in such a manner as to result in or otherwise render obvious the present invention of independent claims 9 and 13.

In addition, the teachings of the Wobben and Flamang references are not sufficient to render independent claims 9 and 13 obvious because the proposed combination of the prior art references would change the principle of operation of the prior art invention being modified. In re Ratti, 270 F.2d 810 (CCPA 1959). As described above, Wobben discloses a generator 7 which is concentric with the double-row roller bearing 15. The rotor 8 of the generator 7 is attached to the rotatable outer ring of the bearing 15 by the carrier 10. The hollow shaft 11, which is attached to the wind turbine rotor blades 13, is also connected to the rotatable outer ring of the bearing 15. Thus, the rotational speed of the hollow shaft 11 will be the same as the rotational speed of the rotor 8 of the generator 7.

The Examiner takes the position that it would have been obvious to one of ordinary skill in the art to modify the wind turbine of Wobben by including the gear unit 130 of Flamang. However, such a modification would change the principle of operation of the Wobben reference because the addition of the gear unit would cause the rotor 8 of the generator 7 to rotate at a different speed than the hollow shaft 11. Further, such a modification would also require substantially redesigning the concentric arrangement of the hollow shaft 11, double-row roller bearing 15 and generator 7 to incorporate a gear unit between the hollow shaft 11 and the generator 7.

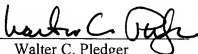
Therefore, it is respectfully submitted that new independent claims 9 and 13, as well as claims 10-12 and 14-16 which depend therefrom, are clearly allowable over the prior art of record.

In view of the foregoing amendments and remarks, it is respectfully submitted that the present application is clearly in condition for allowance. An early notice to that effect is respectfully solicited.

If, after reviewing this Amendment, the Examiner feels there are any issues remaining which must be resolved before the application can be passed to issue, the Examiner is respectfully requested to contact the undersigned by telephone in order to resolve such issues.

Respectfully submitted,

Masaaki SHIBATA et al.

By: 

Walter C. Pledger

Registration No. 55,540

Attorney for Applicants

WCP/akl
Washington, D.C. 20006-1021
Telephone (202) 721-8200
Facsimile (202) 721-8250
January 16, 2007